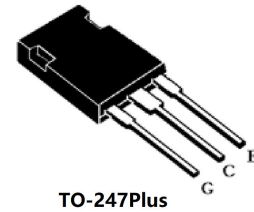


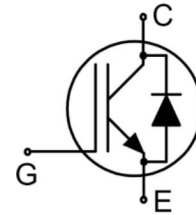
Features

- Very Low Saturation Voltage:
 $V_{CE(sat).type} = 2.3V @ I_C = 200A$
- Maximum Junction Temperature: $T_J = 175^{\circ}C$
- Positive Temperature Co-Efficient
- Tight Parameter Distribution
- High Input Impedance



Applications

- Traction Inverter for HEV/EV
- Auxiliary DC/AC Converter
- Motor Drives
- Other Power-Train Applications
Requiring High Power Switch



Absolute Ratings($T_C=25^{\circ}C$)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
Collector Current-continuous	I_C	$T_C=25^{\circ}C$	400
		$T_C=100^{\circ}C$	200
Diode forward current	I_F	$T_C=25^{\circ}C$	400
		$T_C=100^{\circ}C$	200
Collector Current-pulse (note 1)	I_{CM}	600	A
Gate-Emitter Voltage	V_{GES}	± 30	V
Power Dissipation	P_D	$T_C=25^{\circ}C$	896
		$T_C=100^{\circ}C$	518
Short Circuit Current	I_{SC}	1600	A
Short Circuit Withstand Time	t_{sc}	5	us
Operating Junction Temperature Range	T_J	$-40 \sim +175$	$^{\circ}C$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}C$
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}C$

Electrical Characteristics($T_C=25^{\circ}C$, Unless other noted)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	V

Zero Gate Voltage Collector Current	I _{CES}	V _{CE} =650V,V _{GE} =0V	-	-	250	μA
Gate-body leakage current, forward	I _{GESF}	V _{CE} =0V,V _{GE} =30V	-	-	100	nA
Gate-body leakage current, reverse	I _{GESR}	V _{CE} =0V,V _{GE} =-30V	-	-	-100	nA
On-Characteristics						
Gate Threshold Voltage	V _{GE(th)}	V _{CE} =V _{GE} ,I _C =250uA	3.5	-	6.5	V
Collector-Emitter saturation Voltage	V _{CESAT}	V _{GE} =15V I _C =200A	-	2.3	2.5	V
Dynamic Characteristics						
Input capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1.0MHz	-	6800	-	pF
Output capacitance	C _{oes}		-	664	-	pF
Reverse transfer capacitance	C _{res}		-	140	-	pF
Switching Characteristics						
Turn-on delay time	t _{d(on)}	V _{CC} =400V,I _C =200A, R _G =5Ω, V _{GE} =15V, Inductive Load T _C =25℃	-	56	-	ns
Turn-On rise time	t _r		-	198	-	ns
Turn-Off delay time	t _{d(off)}		-	98	-	ns
Turn-Off Fall time	t _f		-	145	-	ns
Turn-on Loss	E _{on}		-	12.6	-	mJ
Turn-off Loss	E _{off}		-	5.9	-	mJ
Total Loss	E _{ts}		-	18.5	-	mJ
Turn-on delay time	t _{d(on)}	V _{CC} =400V,I _C =200A, R _G =5Ω, V _{GE} =15V, Inductive Load T _C =125℃	-	52	-	ns
Turn-On rise time	t _r		-	188	-	ns
Turn-Off delay time	t _{d(off)}		-	106	-	ns
Turn-Off Fall time	t _f		-	169	-	ns
Turn-on switching Loss	E _{on}		-	20	-	mJ
Turn-off switching Loss	E _{off}		-	12	-	mJ
Total switching Loss	E _{ts}		-	32	-	mJ
Gate Charge	Q _g	V _{CC} =400V,I _C =200A V _{GE} =15V	-	670	-	nC
Gate to Emitter Charge	Q _{ge}		-	98	-	nC
Gate to Collector Charge	Q _{gc}		-	168	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode	V _F	I _F =200A	-	1.8	-	V

Diode Reverse recovery time	t_{rr}	$V_{CE}=400V, I_F=200A$ $di_F/dt=200A/us$	-	136	-	ns
Diode Reverse recovery charge	Q_{rr}		-	3.6	-	μC

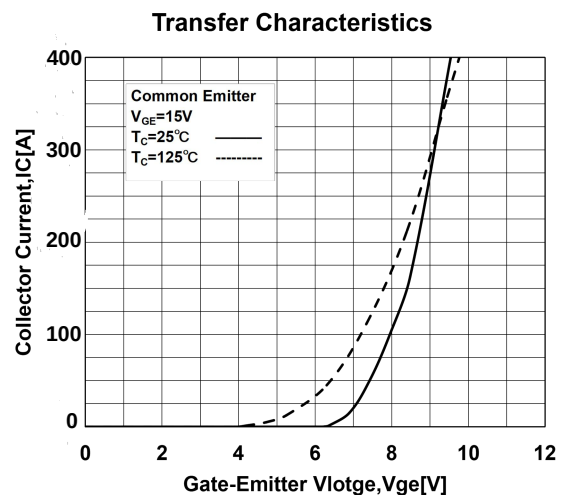
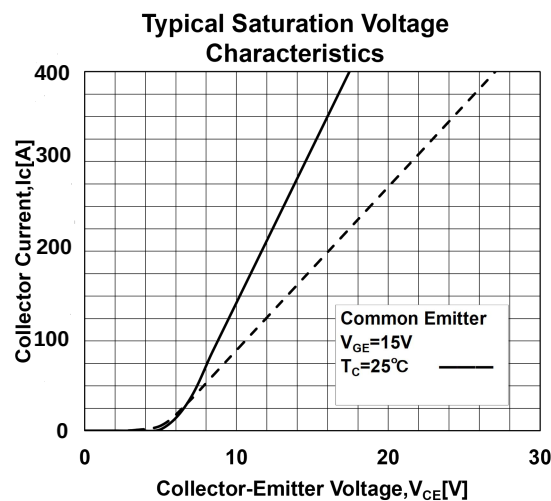
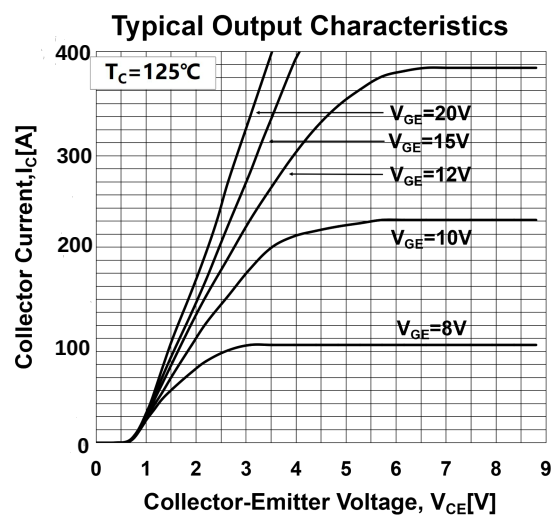
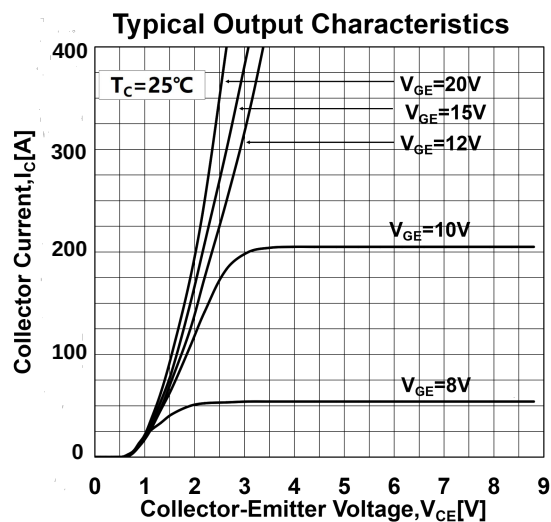
Thermal Characteristic

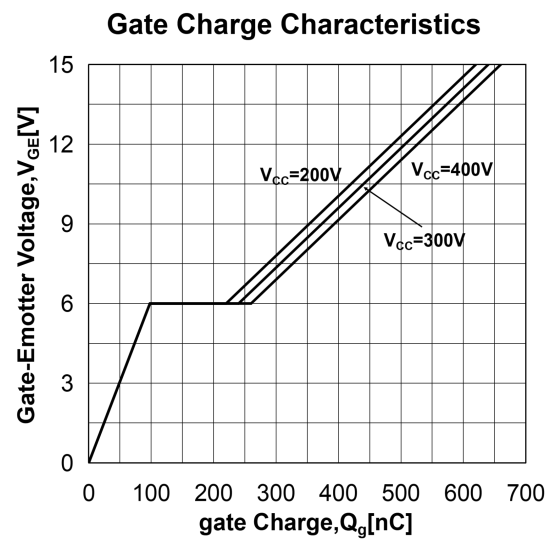
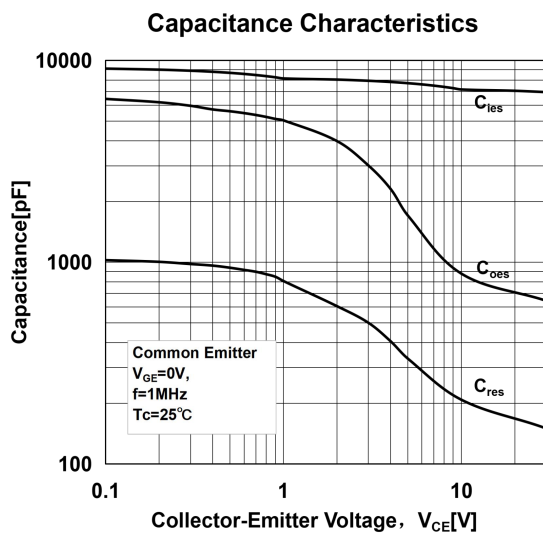
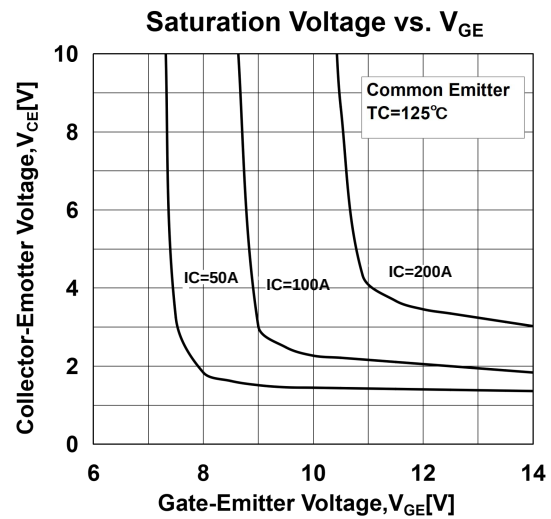
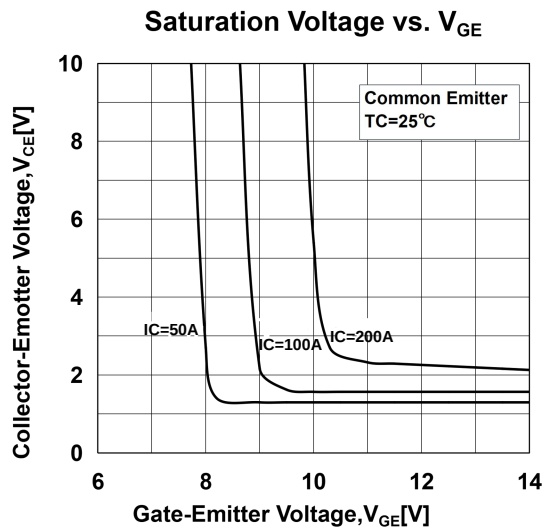
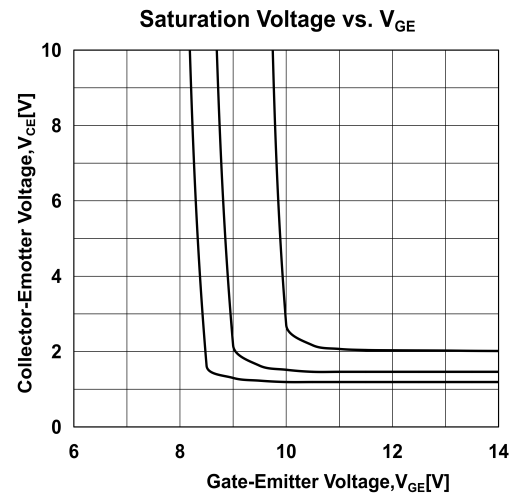
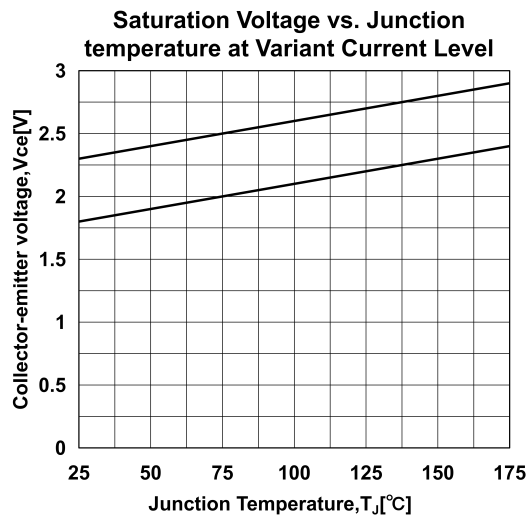
Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	$R_{th(j-c)}$	0.16	$^{\circ}C/W$
Thermal Resistance, Junction to Case (Diode)	$R_{th(j-c)}$	0.32	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$

Notes:

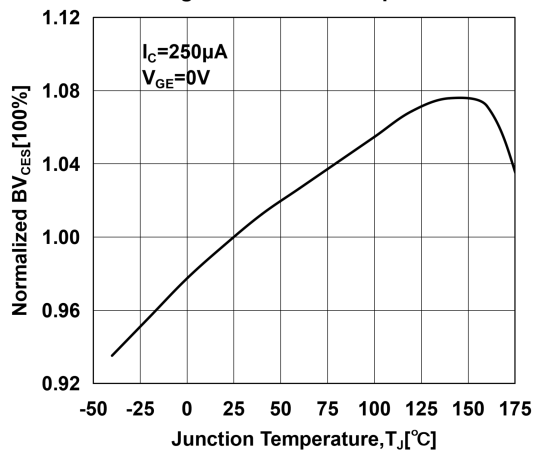
1. Repetitive Rating: Pulse width limited by maximum junction temperature

Electrical Characteristics(curves)

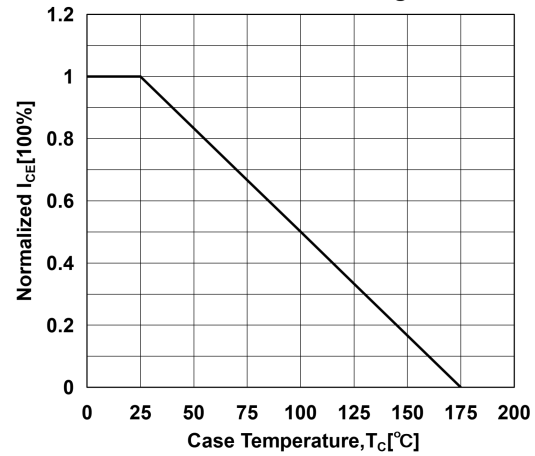




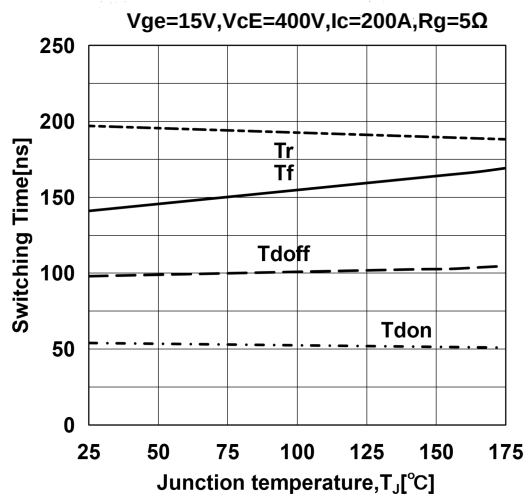
Normalized Collector to Emitter Breakdown Voltage vs. Junction Temperature



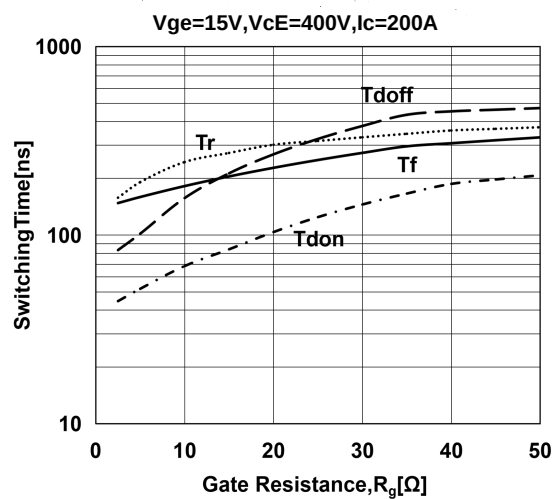
Normalized Collector-Emitter Current Standard Derating Curve



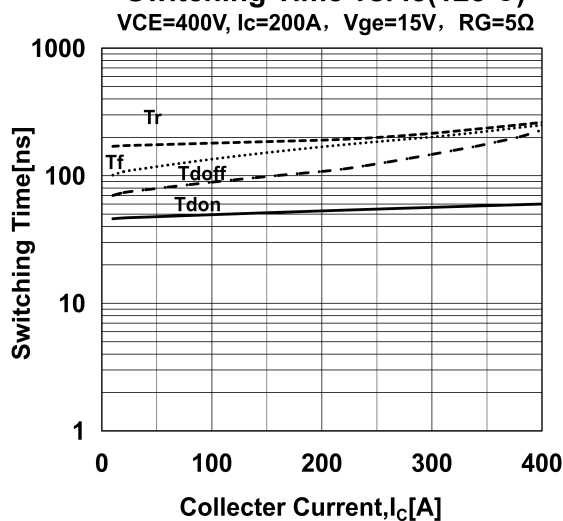
Switching Time vs. T_J



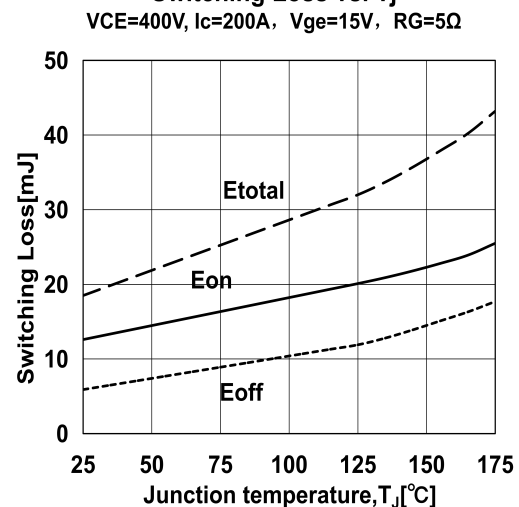
Switching Time vs. R_g (125°C)

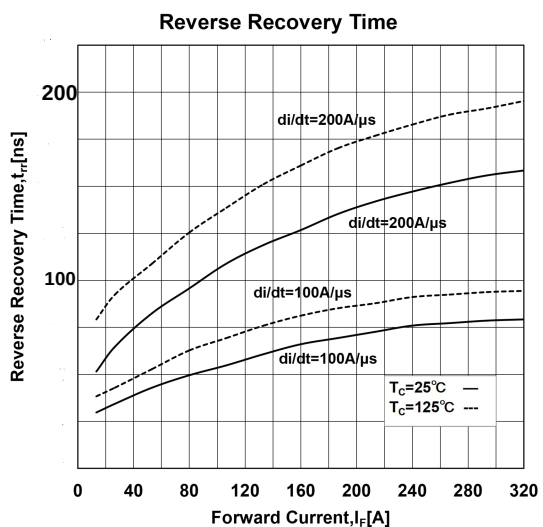
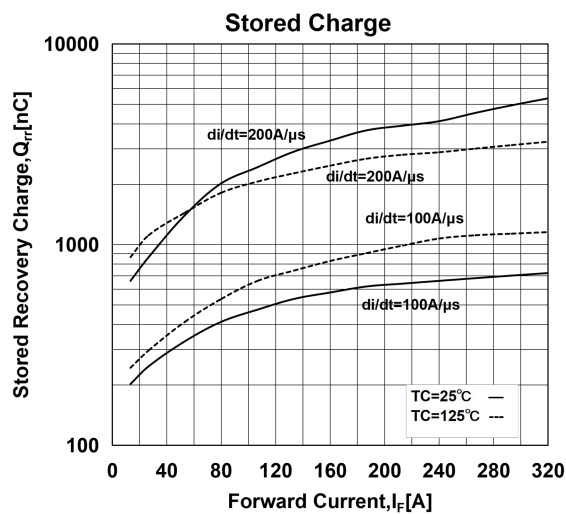
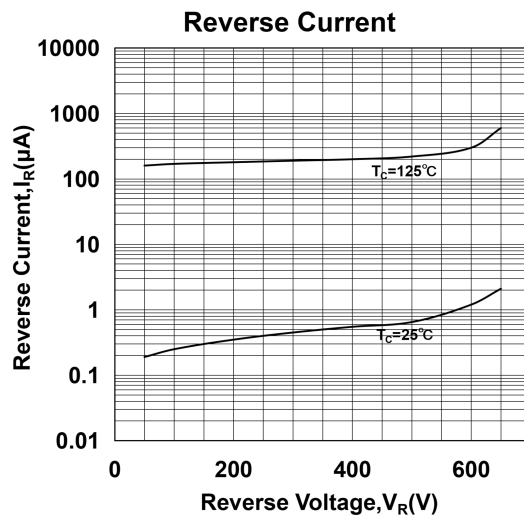
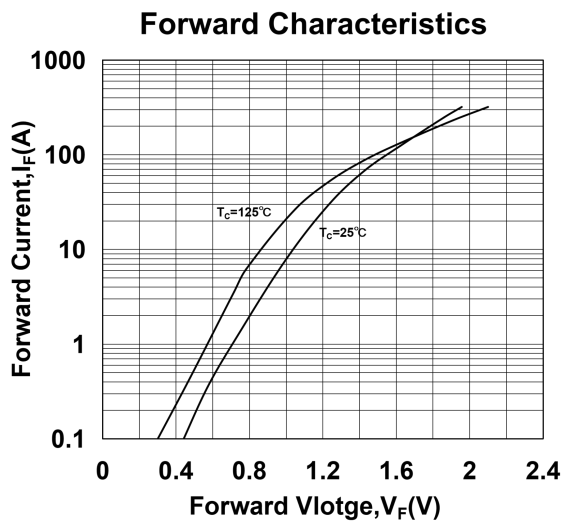
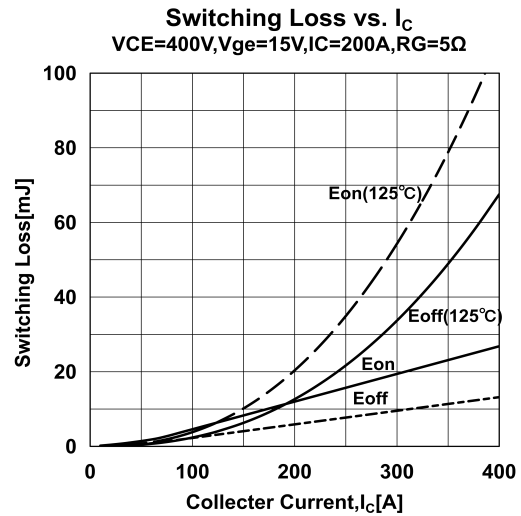
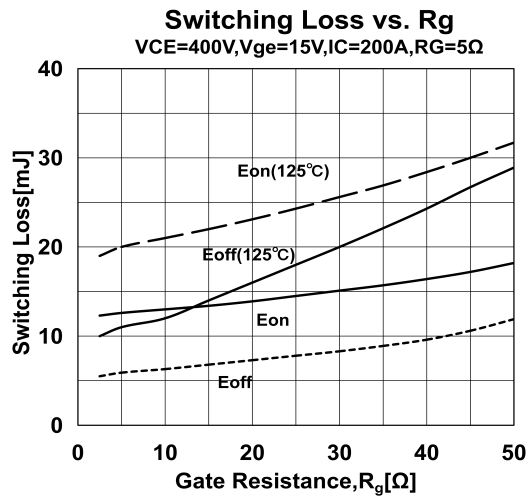


Switching Time vs. I_C (125°C)

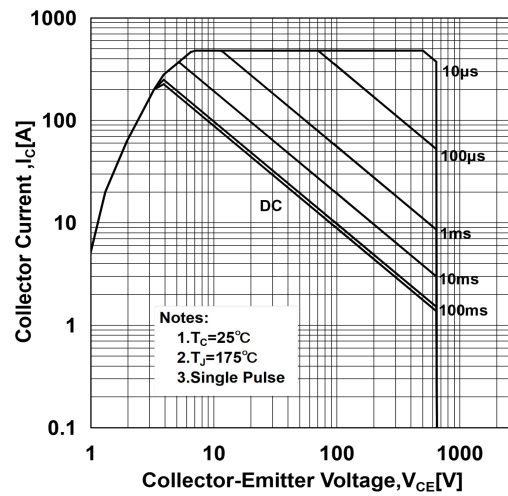


Switching Loss vs. T_J

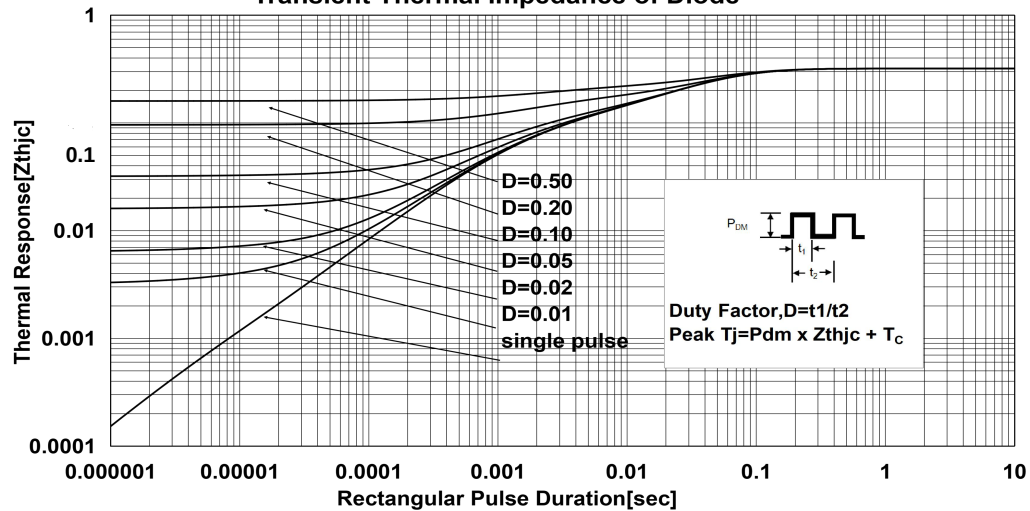




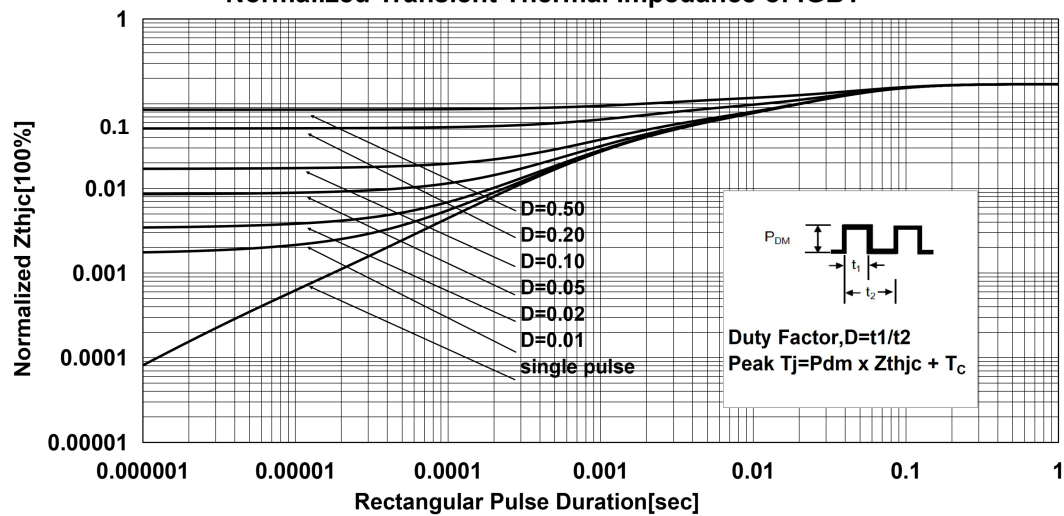
Forward Bias Safe Operating Area



Transient Thermal Impedance of Diode



Normalized Transient Thermal Impedance of IGBT



Package Mechanical DATA

